

CLAIMS:

1. A method of manufacturing rare-earth sintered magnets, characterized by subjecting an alloy composed of 20 to 30 wt% of a constituent R (R being samarium alone or at least 50 wt% samarium in combination with one or more other rare-earth element), 10 to 45 wt% iron, 1 to 10 wt% copper and 0.5 to 5 wt% zirconium, with the balance being cobalt and inadvertent impurities, to the steps of, in order, melting, casting, coarse size reduction, milling, molding in a magnetic field, sintering and aging so as to form a sintered magnet, surface machining the sintered magnet by cutting and/or grinding, metal plating the surface-machined magnet, then heat treating the metal-plated magnet at 80 to 15 850° C for a period of from 10 minutes to 50 hours.
2. The rare-earth sintered magnet manufacturing method of claim 1, characterized in that the metal-plating metal is one or more selected from among copper, nickel, cobalt, tin, 20 and alloys thereof.
3. The rare-earth sintered magnet manufacturing method of claim 1 or 2, characterized in that the heat treatment is carried out in an argon, nitrogen, air or low-pressure 25 vacuum atmosphere having an oxygen partial pressure of  $10^{-4}$  Pa to 50 kPa.
4. A rare-earth sintered magnet composed of 20 to 30 wt% of a constituent R (R being samarium alone or at least 50 30 wt% samarium in combination with one or more other rare-earth element), 10 to 45 wt% iron, 1 to 10 wt% copper and 0.5 to 5 wt% zirconium, with the balance being cobalt and inadvertent impurities, which rare-earth sintered magnet is characterized by having on a surface thereof, either 35 directly or over an intervening metal-plating layer, a metal oxide layer and/or a metal nitride layer.

5. The rare-earth sintered magnet of claim 4,  
characterized in that the metal-plating layer and the metal  
oxide layer and/or metal nitride layer have a combined  
thickness of at least 1  $\mu\text{m}$  but not more than 100  $\mu\text{m}$ , and the  
5 metal oxide layer and/or metal nitride layer has a thickness  
of at least 0.1  $\mu\text{m}$  but not more than 100  $\mu\text{m}$ .

6. The rare-earth sintered magnet of claim 4 or 5,  
characterized in that the metal-plating metal is one or more  
10 selected from among copper, nickel, cobalt, tin, and alloys  
thereof.

7. A method of manufacturing rare-earth sintered magnets,  
characterized by subjecting an alloy composed of 20 to 35  
15 wt% of a constituent R (R being one or more rare-earth  
element selected from among neodymium, praseodymium,  
dysprosium, terbium and holmium), up to 15 wt% cobalt, 0.2  
to 8 wt% boron, and up to 8 wt% of one or more element  
selected from among nickel, niobium, aluminum, titanium,  
20 zirconium, chromium, vanadium, manganese, molybdenum,  
silicon, tin, gallium, copper and zinc as an additive, with  
the balance being iron and inadvertent impurities, to the  
steps of, in order, melting, casting, coarse size reduction,  
millling, molding in a magnetic field, sintering and heat  
25 treatment to form a sintered magnet, surface machining the  
sintered magnet by cutting and/or grinding, metal plating  
the surface-machined magnet, then heat treating the  
metal-plated magnet at 80 to 700°C for a period of from 10  
minutes to 50 hours.

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8. The method of manufacturing rare-earth sintered  
magnets according to claim 7, characterized in that the  
metal-plating metal is one or more selected from among  
copper, nickel, cobalt, tin, and alloys thereof.

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9. The method of manufacturing rare-earth sintered magnets according to claim 7 or 8, characterized in that heat treatment after the metal plating is carried out in an argon, nitrogen, air or low-pressure vacuum atmosphere  
5 having an oxygen partial pressure of  $10^{-4}$  Pa to 50 kPa.

10. A rare-earth sintered magnet composed of 20 to 35 wt% of a constituent R (R being one or more rare-earth element selected from among neodymium, praseodymium, dysprosium,  
10 terbium and holmium), up to 15 wt% cobalt, 0.2 to 8 wt% boron, and up to 8 wt% of one or more element selected from among nickel, niobium, aluminum, titanium, zirconium, chromium, vanadium, manganese, molybdenum, silicon, tin, gallium, copper and zinc as an additive, with the balance  
15 being iron and inadvertent impurities, which rare-earth sintered magnet is characterized by having on a surface thereof, either directly or over n metal-plating layers (n being an integer such that  $n \geq 1$ ), a metal oxide layer and/or a metal nitride layer.  
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11. The rare-earth sintered magnet of claim 10, characterized in that the metal-plating layer and the metal oxide layer and/or metal nitride layer have a combined thickness of at least 1  $\mu\text{m}$  but not more than 100  $\mu\text{m}$ , and the  
25 metal oxide layer and/or metal nitride layer has a thickness of at least 0.1  $\mu\text{m}$  but not more than 100  $\mu\text{m}$ .

12. The rare-earth sintered magnet of claim 10 or 11, characterized in that the metal-plating metal is one or more  
30 selected from among copper, nickel, cobalt, tin, and alloys thereof.